Wahoo Bay Website

Project Sponsor and Contact Information

Wahoo Bay
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Team Members

Hunter Behrman - Computer Science
Mason Collins - Computer Science
Michelle Tan - Computer Science
Vinicius Taveira Salgado - Computer Science
Dan Zimmerman (Team Leader) - Computer Science

**Florida Atlantic University
Department of Electrical Engineering and Computer Science
Fall 2022**

Project Summary

Our team is developing a software system that allows a user to fully engage in the immersive activities of the Wahoo Bay Educational Marine Park. The software system will have two primary components: a data section where users can access all the data collected from Wahoo Bay, and an educational section for teachers and students to create and experience classes.

Table of Contents

Problem Description

Wahoo Bay is a small, protected, shallow-water inlet in Pompano Beach, FL, that is being transformed into an immersive educational marine park experience, combining underwater and on-shore experiences with the goal of raising awareness of the importance of keeping our oceans and reefs healthy and thriving in an entertaining and memorable way.

Wahoo Bay needs a method for potential visitors and researchers to access the data that is being made available through sensors and cameras on site at the bay. This data is currently being collected and sent to SenseStream, but that is not a user friendly layout for most. Our team will need to collect this data from SenseStream, and display it properly for those who would like to view it. Additionally, this data will potentially need to be downloaded by researchers so we need to make it accessible in that way too.

On top of this our advisors at Wahoo Bay would like a way to teach students about the bay as well as marine ecology in general. A method is needed for teachers to create classes and for students to access these classes.

So, our problem is twofold: gather and host the data from Wahoo Bay, and then share that information in a user-friendly way.

Proposed Solution

To solve this problem our team is developing a software system that allows a user to fully engage in the immersive activities of the Wahoo Bay Educational Marine Park. The software system will have two primary components.

The first component consists of live video and data feeds of current weather and water conditions derived from sensors taking measurements in real time at the site. The sensors and cameras for collecting this data are already in place at Wahoo Bay, but our team will need to access the data through the SenseStream API and then save it to Wahoo Bay's database for easier access. This will allow us to build the second component of the project.

The second component is an educational experience linked to the data that will allow the user to explore the meaning of the data in context, along with educational content targeted towards specific grade-levels of children. There are three main requirements for this section. The team will need to both manipulate the data to a more convenient format, and figure out the best way to present this data to an average viewer of the website. Additionally, while the grade specific educational material is not being written by us we will need to find a format that is both simple enough for elementary school students and one interesting enough to keep middle and high school students from becoming disinterested. To allow students to save progress, for teachers to create classes, and for researchers to download our data safely we will also need to create a user management system.

User accounts will simply be part of a table in Wahoo Bay's database, but for user safety security measures have to be considered as well. User passwords will, of course, be encrypted. Sign-in and the persistence of said sign-in will be handled using JSON Web Tokens (JWTs). JWTs handle security by being signed through our backend during creation with a secret key. This is important because all the data on the token is not encrypted meaning without the signature the token could be recreated and used by anyone. On top of the security this token adds, it also creates a convenience for any potential future expansion of the web servers. When handling sign-in through JWTs the token is given to the user and stored on their device, so the user will send the JWT with every request allowing them to stay signed-in. This is better than the older approach of handling user sign-in on the server side as it prevents the user from accidentally being signed-out if they are served a webpage from a different server than the one they originally signed-in on.

Beyond Wahoo Bay specifically, the hope is that this website's format is well received and transferable to other nature studies sites. The Wahoo Bay team expressed interest in potentially using the website as a template for similar projects all over the world. As such, formatting of the website and simplicity of the codebase are two primary focuses when it comes to the work of this project.
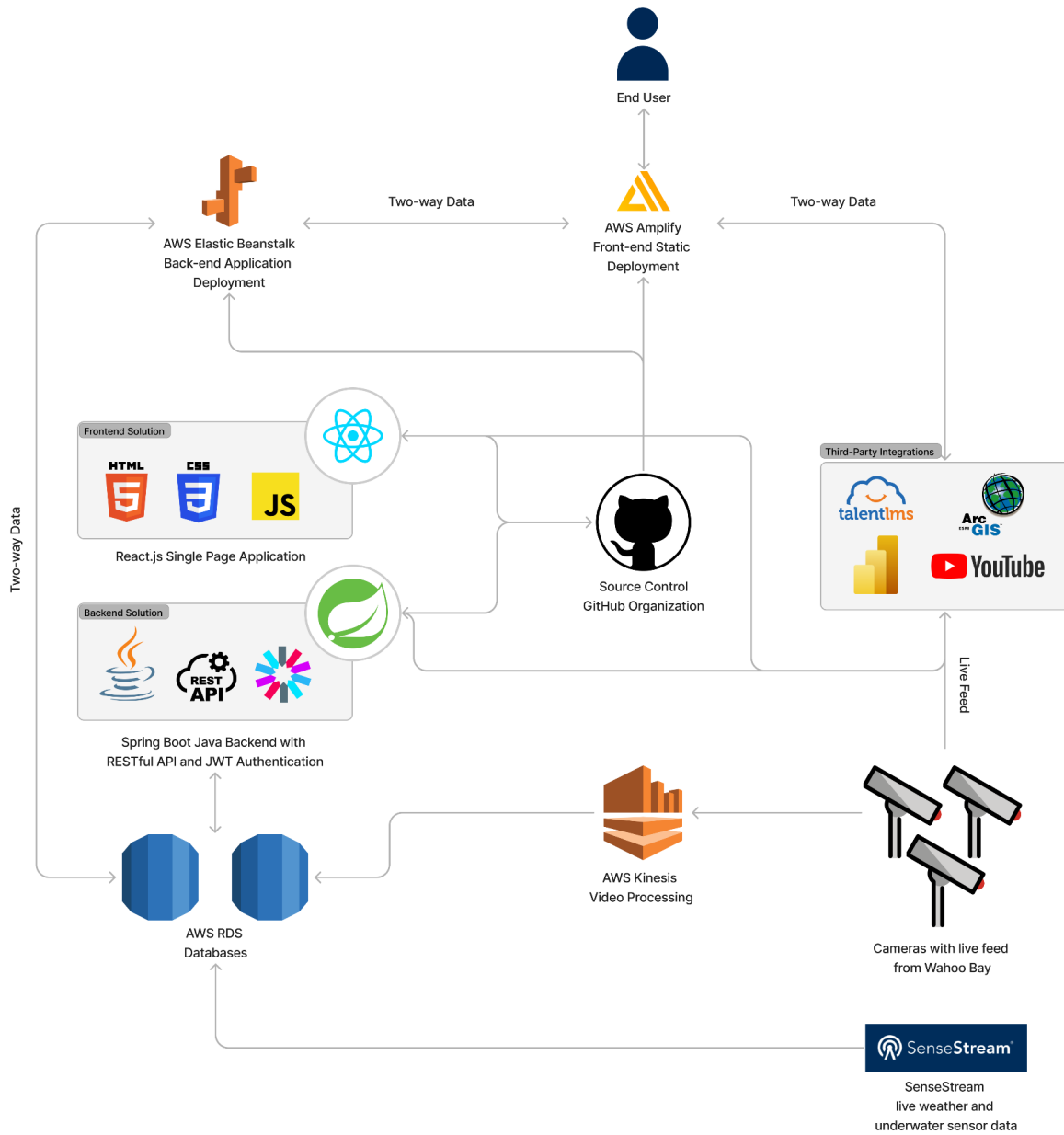
Project Requirements

Functional Requirements

F.1 The software system shall allow access to live data available from the organization's sensors.

F.2 The software system shall host three live video feeds.

F.3 The software system shall have source control.

F.4 The software system shall have a learning area with options available for different grade levels of students.

F.7 The software system shall have administrative accounts to moderate the website.

F.8 The software system shall provide a RESTful API for curating data in the database.

F.9 The software system shall provide a web-based UI with the ability to CRUD (Create Retrieve Update Delete) manage users.

F.10 The software system should capture and save time-lapse images of Wahoo Bay for the sake of recording changes over time.

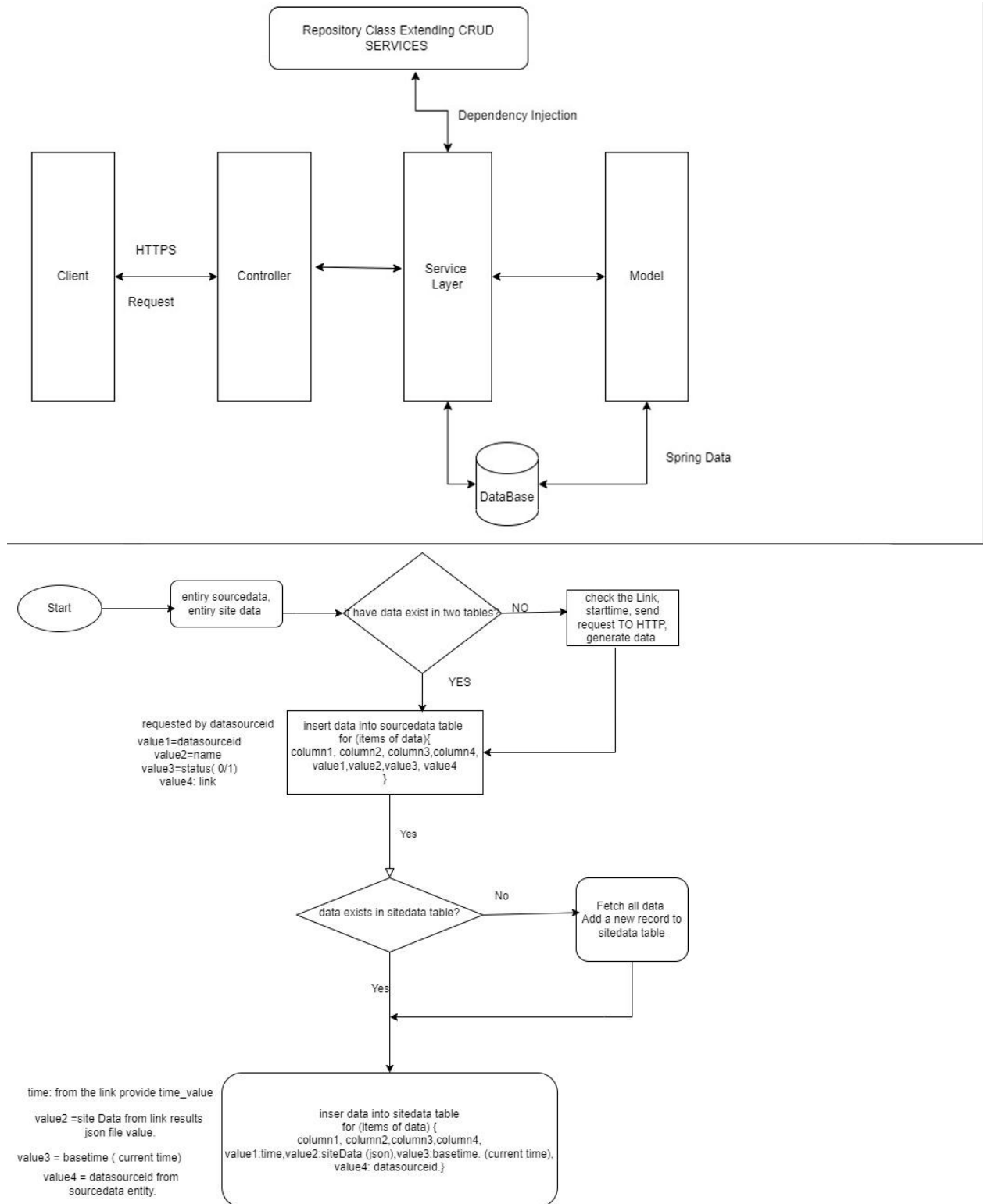F.11 The software system should allow for integration with social media where appropriate.

User Requirements

U.1 The software system shall allow users to create and delete personal accounts.

U.2 The software system shall allow users to log into their accounts to create profiles.

U.3 The software system shall allow access to all content without the need of an account.

U.4 The software system should save user progress in lessons using cookies or their account.

System Design

End User

AWS Elastic Beanstalk
Back-end Application
Deployment

Two-way Data

AWS Amplify
Front-end Static
Deployment

Two-way Data

Two-way Data

Frontend Solution

React.js Single Page Application

Source Control
GitHub Organization

Third-Party Integrations

Backend Solution

Spring Boot Java Backend with
RESTful API and JWT Authentication

Live Feed

AWS RDS
Databases

AWS Kinesis
Video Processing

Cameras with live feed
from Wahoo Bay

SenseStream
live weather and
underwater sensor data

Back-end Sub-system Design:

Sub-system Design

Hunter Behrman

The work I have done so far is the creation and documentation of the main APIs that the frontend team will use to get data from the database. So far, I have made an API that returns all the information in the latest row of the database, and an API that will return all rows in the database (and their information) between two timestamps given by the API caller. Similarly, I have drafted and then finalized a .YAML, Swagger formatted information file that documents the two APIs I have made, what they require when called, and what their responses look like.

I have had experience with Spring Boot before, so it wasn't too much of a challenge for me to work with it at a more professional level. However, prior to this, I had no experience with API documentation, so a challenge for me was learning the Swagger format and what is usually needed for documentation of an API.
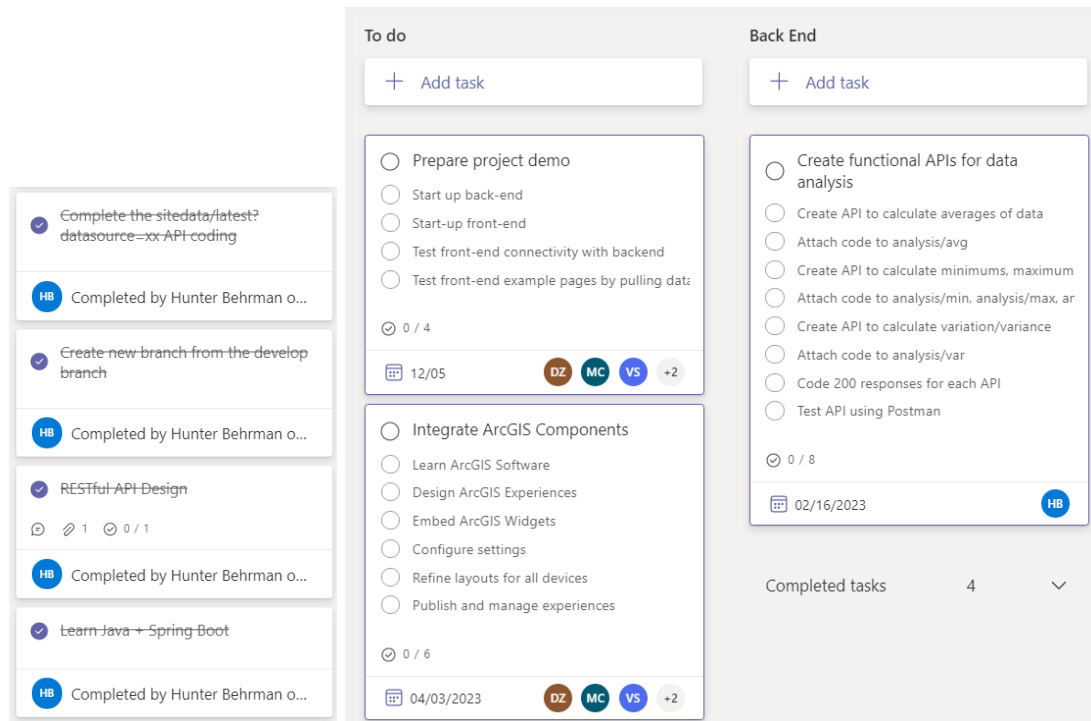

Tasks above are all those that have been completed by me thus far as well as future ones.

Mason Collins

The components I have worked on so far are all user related. Several database tables have been created to store user related data and user registration and authentication functions have been added to our Spring Boot application. These components need to interface with one another and the API portion needs to interface with the front-end of our website. The user registration and authentication APIs work as a bridge between the incoming front-end data and the back-end database.

Some challenges I have encountered so far are unfamiliarity with Spring Boot, JWTs, and APIs. These challenges were lessened greatly by the early tasks I received that gave me time to study each of these topics. Back-end work is entirely new to me and as such the implementation of each component comes with a lot of learning.
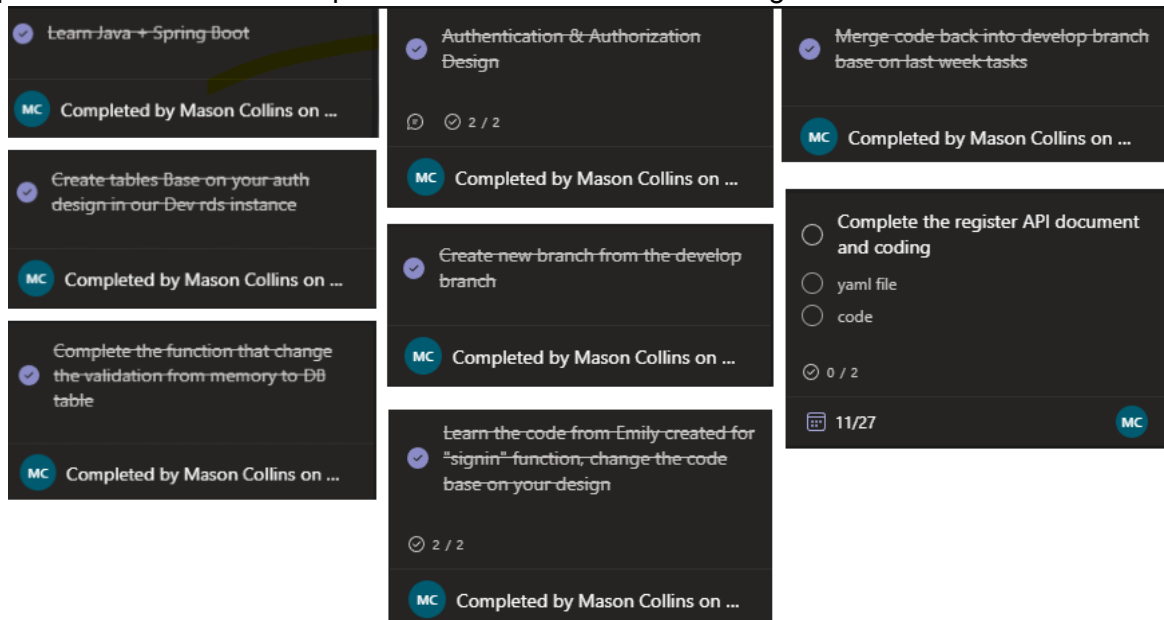

Each task seen above has or will be completed by the project demo for ED1. As the tasks I have assigned after this are group tasks only for the time being they will be seen in the project schedule section.

Vinicius Taveira Salgado

The work I have done so far is related to the front end. I've needed part of the meeting to understand what the website will present and how. I am using react to develop the front-end and integrating PowerBI to the framework. The tasks I have done so far are learning React from a development point of view and learning how to integrate PowerBI into it. In addition, I will aggregate the back-end with the front-end so it is a presentable and functional product.

The tasks below are what was completed in addition with the tasks that will be completed in the future.
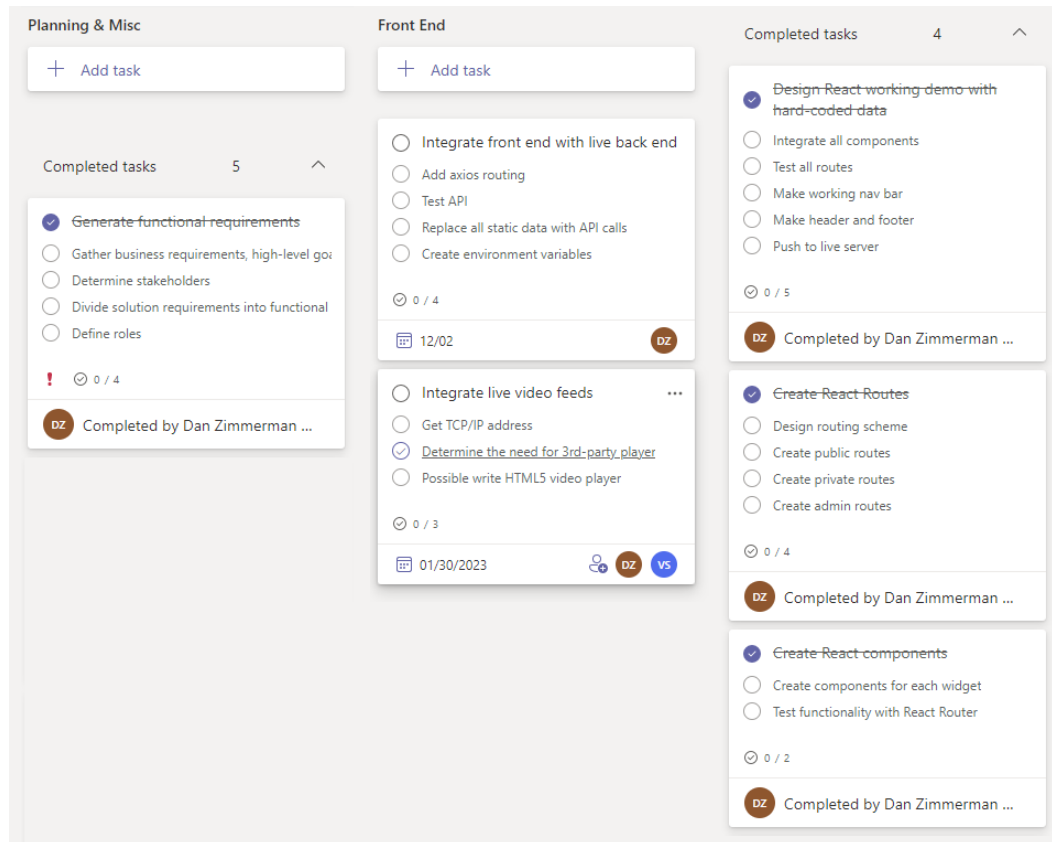
Michelle Tan

The components I have worked on so far are to get data from the SenseStream API and save the data into our database. I have created a few tables in the Wahoo Bay database. I created a function to fetch all data from the SenseStream API then save and add the new data into the sourceData table and the siteData table. These functions have been added to our Spring Boot application in IntelliJ IDEA. This data collection has to be scheduled based on the time, then all fetched data is saved into a database. The reason we base the data collection on time is to prevent duplicate data.

Some challenges I have encountered so far are unfamiliarity with Intellij IDEA. Spring Boot and APIs are also new to me. Backend requires a lot of experience.

Sometimes Intellij IDEA faces dependency issues, studying these issues takes time. I don't have any prior experience with backend. It takes a few days to figure out by searching online and studying.

Each task seen above has or will be completed by the project demo for ED1. As the tasks I have assigned after this are group tasks only for the time being they will be seen in the project schedule section.

Dan Zimmmerman

As the Team Leader, I am responsible for many aspects of this project. I lead the weekly recorded MS Teams meetings that we have held with our sponsor since the week we were assigned to them. During those meetings, I give brief PowerPoint presentations of the work our team accomplished the previous week, I pose any questions or obstacles we ran into and report whether we were able to resolve them or if they are still outstanding and present the next steps in our plan to the team. I also field any questions or concerns that the sponsors have. While I do lead and guide the meetings, both entire teams participate in an open dialogue.

In addition to being the Team Leader, I am also one of the front-end developers. I made the decision to develop the front end in React due to the flexibility of that component-based platform and because of the wide range of available modules designed to extend the capabilities of the front end. I have about a year's worth of experience working with React, and I am not an expert, so this very much a learning experience for me. We are working with large amounts of highly technical sensor data, and it is my job to design an interface that displays that data in ways that even children can appreciate and understand. It helps that we are also showing live streaming videos of turtles. Additionally, we are doing some very unusual integrations of other platforms, like PowerBI, ArcGIS, and a Learning Management System called TalentLMS, all of which I am responsible for making work inside our React framework.

The tasks below indicate my involvement in various aspects of planning, and all aspects of front-end development. This includes the initial planning and requirements development phase, the current state of the project, and planned integrations for next year that will bring us all the way up to the end of next semester.

Planning & Misc

+ Add task

Completed tasks   5   ⌃

- ✓ ~~Generate functional requirements~~
  - ○ Gather business requirements, high-level goal
  - ○ Determine stakeholders
  - ○ Divide solution requirements into functional
  - ○ Define roles

  ❗ ⊘ 0 / 4

  DZ Completed by Dan Zimmerman …

- ✓ ~~Create GitHub Organization~~
  - ○ Create organization
  - ○ Add each team member
  - ○ Ensure all team members can access

  ⊘ 0 / 3

  DZ Completed by Dan Zimmerman …

- ✓ ~~Design wireframe for dashboard~~
  - ○ Use WB's diagram and business requirement
  - ○ Mock up in Illustrator

  ⊘ 0 / 2

  DZ Completed by Dan Zimmerman …

- ✓ ~~Diagram use cases~~
  - ○ Gather requirements from Requirements doc
  - ○ Map out user experience
  - ○ Determine and define user roles
  - ○ Diagram in Visio

  ⊘ 0 / 4

  DZ Completed by Dan Zimmerman …

- ✓ ~~Layout sitemap~~
  - ○ Draw out on paper
  - ○ Create Flowmapp team account and invite al
  - ○ Configure sitemap on Flowmapp
  - ○ Train WahooBay team to use Flowmapp

  ⊘ 0 / 4

  DZ Completed by Dan Zimmerman …

Front End

+ Add task

- ○ Integrate front end with live back end
  - ○ Add axios routing
  - ○ Test API
  - ○ Replace all static data with API calls
  - ○ Create environment variables

  ⊘ 0 / 4

  📅 12/02   DZ

- ○ Integrate live video feeds   …
  - ○ Get TCP/IP address
  - ◔ Determine the need for 3rd-party player
  - ○ Possible write HTML5 video player

  ⊘ 0 / 3

  📅 01/30/2023   👤 DZ VS

Completed tasks   4   ⌃

- ✓ ~~Design React working demo with hard-coded data~~
  - ○ Integrate all components
  - ○ Test all routes
  - ○ Make working nav bar
  - ○ Make header and footer
  - ○ Push to live server

  ⊘ 0 / 5

  DZ Completed by Dan Zimmerman …

- ✓ ~~Create React Routes~~
  - ○ Design routing scheme
  - ○ Create public routes
  - ○ Create private routes
  - ○ Create admin routes

  ⊘ 0 / 4

  DZ Completed by Dan Zimmerman …

- ✓ ~~Create React components~~
  - ○ Create components for each widget
  - ○ Test functionality with React Router

  ⊘ 0 / 2

  DZ Completed by Dan Zimmerman …

- ✓ ~~Create React site~~
  - ○ Install all dependencies
  - ○ Create React app
  - ○ Push to GitHub repo

  ⊘ 0 / 3

  DZ Completed by Dan Zimmerman …

To do

+ Add task

- ○ Prepare project demo
  - ○ Start up back-end
  - ○ Start-up front-end
  - ○ Test front-end connectivity with backend
  - ○ Test front-end example pages by pulling data

  ⊘ 0 / 4

  📅 12/05   DZ MC VS +2

- ○ Integrate ArcGIS Components
  - ○ Learn ArcGIS Software
  - ○ Design ArcGIS Experiences
  - ○ Embed ArcGIS Widgets
  - ○ Configure settings
  - ○ Refine layouts for all devices
  - ○ Publish and manage experiences

  ⊘ 0 / 6

  📅 04/03/2023   DZ MC VS +2

- ○ Integrate PowerBI components
  - ○ Get business requirements
  - ○ Design reports
  - ○ Design API if needed
  - ○ Configure React component
  - ○ Test

  ⊘ 0 / 5

  📅 04/03/2023   DZ MC VS +2

- ○ Integrate 3rd-party LMS
  - ○ Get API from 3rd party ASAP

  ⊘ 0 / 1

  📅 04/03/2023   DZ MC VS +2

Project Schedule

✓ Write Demo Code

XG Completed by Xiaolei Guo on 11...

✓ Initial project

XG Completed by Xiaolei Guo on 10...

✓ Backend Solution Design

XG Completed by Xiaolei Guo on 10...

✓ RESTful API Design
💬 📎 1 ⊘ 0 / 1

XG Completed by Xiaolei Guo on 11...

✓ DB Design
◯ DB diagram with data style with each column
💬 📎 1 ⊘ 0 / 1

Completed by Michelle Tan on 1...

✓ Learn Java + Spring Boot

HB Completed by Hunter Behrman o...

✓ Learn Java + Spring Boot

MC Completed by Mason Collins on ...

✓ Learn Java + Spring Boot

Completed by Michelle Tan on 1...

✓ Create new branch from the develop branch

HB Completed by Hunter Behrman o...

✓ Create new branch from the develop branch

MC Completed by Mason Collins on ...

✓ Create new branch from the develop branch

Completed by Michelle Tan on 1...

✓ Create two tables in the Dev rds
📣

Completed by Michelle Tan on 1...

✓ Sensor Data Request Service Design

https://api.sensestream.org/observations/me
starts=1660204800000&end=1664458800000
You can use this url to get the SenseStream
data
💬 ⊘ 1 / 1

XG Completed by Xiaolei Guo on 11...

✓ Request SenseStream API
💬

XG Completed by Xiaolei Guo on 10...

✓ Assign tasks to team members

XG Completed by Xiaolei Guo on 10...

✓ Authentication & Authorization Design
💬 ⊘ 2 / 2

MC Completed by Mason Collins on

✓ Merge code back into develop branch base on last week tasks

XG Completed by Xiaolei Guo on 11...

✓ Merge code back into develop branch base on last week tasks

MC Completed by Mason Collins on ...

✓ Setup AWS test environment for ⋯ wahoobay team

XG Completed by Xiaolei Guo on 11...

✓ Learn the code from Emily created for "signin" function, change the code base on your design
⊘ 2 / 2

MC Completed by Mason Collins on ...

✓ Complete the function that change the validation from memory to DB table

MC Completed by Mason Collins on ...

✓ Complete the sitedata/latest? datasource=xx API coding

HB Completed by Hunter Behrman o...

✓ Complete the sensestream data request service coding

Completed by Michelle Tan on 1...

✓ Create tables Base on your auth design in our Dev rds instance

MC Completed by Mason Collins on ...

○ Complete the register API document and coding

○ code

⊘ 1 / 2

🗓 11/27   MC

Completed tasks   28   ∧

✓ ~~Tasks for Michelle~~

⊘ 4 / 4

👤 Completed by Michelle Tan on 1...

✓ ~~Complete the sitedata API document and coding base on the time range~~

○ yaml file

○ code

⊘ 0 / 2

HB Completed by Hunter Behrman o...

✓ ~~Review the code for backend team base on last week tasks~~

XG Completed by Xiaolei Guo on 11...

✓ ~~Merge code back into develop branch base on last week tasks~~

XG Completed by Xiaolei Guo on 11...

○ Integrate live video feeds

○ Get TCP/IP address

○ Determine the need for 3rd-party player

○ Possible write HTML5 video player

⊘ 0 / 3

🗓 01/30/2023   DZ VS

✓ ~~Learn React~~

VS Completed by Vinicius Taveira Sa...

✓ ~~PowerBI Proof of Concept~~

DZ Completed by Dan Zimmerman ...

✓ ~~Site map/Wireframing~~

DZ Completed by Dan Zimmerman ...

✓ ~~Front-end prototype~~

DZ Completed by Dan Zimmerman ...

✓ ~~Integrate Azure Kanban Board into Teams~~

💬

DZ Completed by Dan Zimmerman ...

✓ ~~Acquire ArcGIS Trial~~

DZ Completed by Dan Zimmerman ...

○ Create functional APIs for data analysis

○ Create API to calculate averages of data

○ Attach code to analysis/avg

○ Create API to calculate minimums, maximum

○ Attach code to analysis/min, analysis/max, ar

○ Create API to calculate variation/variance

○ Attach code to analysis/var

○ Code 200 responses for each API

○ Test API using Postman

⊘ 0 / 8

🗓 02/16/2023   HB

○ Prepare project demo

○ Start up back-end

○ Start-up front-end

○ Test front-end connectivity with backend

○ Test front-end example pages by pulling data

⊘ 0 / 4

🗓 12/02   DZ MC VS +2

○ Integrate ArcGIS Components

○ Learn ArcGIS Software

○ Design ArcGIS Experiences

○ Embed ArcGIS Widgets

○ Configure settings

○ Refine layouts for all devices

○ Publish and manage experiences

⊘ 0 / 6

🗓 04/03/2023   DZ MC VS +2

○ Integrate PowerBI components

○ Get business requirements

○ Design reports

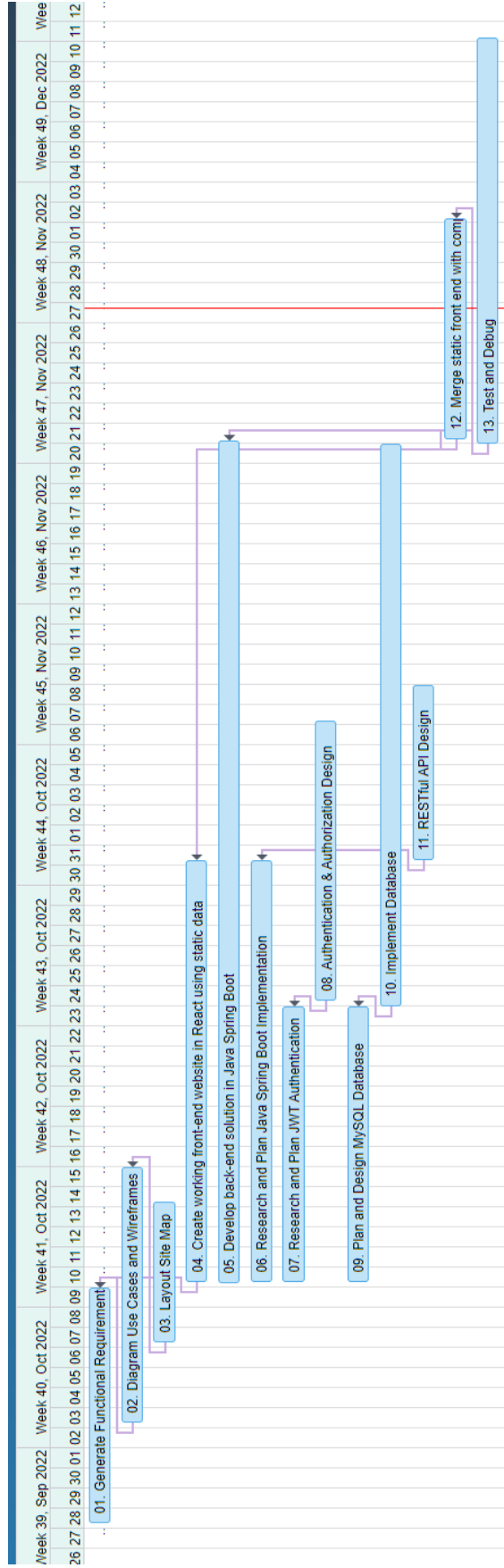○ Design API if needed

○ Configure React component

○ Test

⊘ 0 / 5

🗓 04/03/2023   DZ MC VS +2

○ Integrate 3rd-party LMS

○ Get API from 3rd party ASAP

⊘ 0 / 1

🗓 04/03/2023   DZ MC VS +2

Gantt Chart Timeline for Fall 2022

Gantt Chart Timeline for Spring 2023